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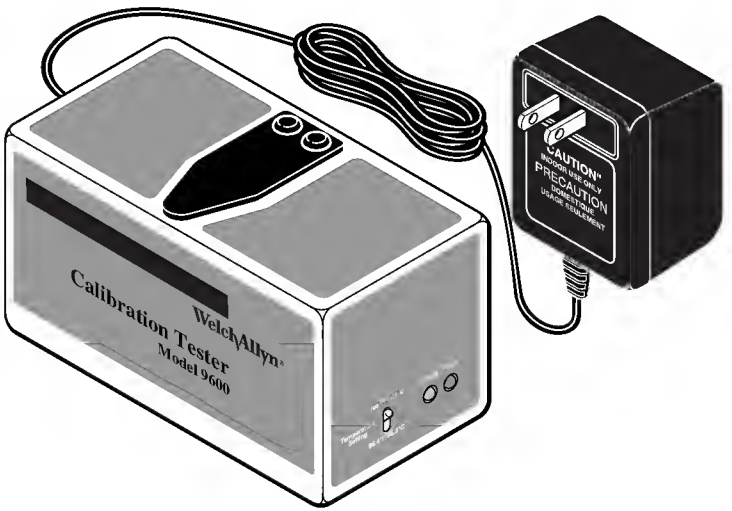
Operation Manual

Welch Allyn®

Calibration Tester
Model 9600


Welch Allyn
Calibration Tester
Model 9600
CAUTION
INDOOR USE ONLY
PRECAUTION

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INTRODUCTION

WHAT THE 9600 CALIBRATION SYSTEM IS

The 9600 Calibration Tester is a device for testing the calibration of Welch Allyn thermometers. The unit contains solid-state circuitry for long-term stability, with virtually no maintenance.

The 9600 System provides a convenient "reference patient" for testing the calibration of:

- Thermistor-based thermometers (for example, Models 500, 600, 650, 678, 679, 767T, SureTemp® and SureTemp4®).
- Infrared-technology Model 9000 and Model 9020 Welch Allyn thermometers.

To maintain long-term stability, as well as to ensure strict control over varying environmental conditions, only the highest precision components are used in the construction of the 9600 System. For this reason, the instrument must be factory calibrated on a regular basis. The initial calibration, if performed within the warranty period, is free of charge. Please contact your Welch Allyn Customer Service representative at (800) 854-2904 for further information.

WHAT THE 9600 CALIBRATION SYSTEM DOES

The 9600 Calibration Tester provides a tightly regulated temperature source that is compatible with all Welch Allyn thermometer products. The device's "temperature" can be taken with the knowledge and assurance that precise readings will be obtained as the unit is factory calibrated to very close tolerances. User adjustments are not required or recommended.

With the 9600 System, the difficult and time-consuming setup, precision calibration, and maintenance requirements of water baths and other general purpose equipment, such as ovens and environmental chambers, is eliminated.

MAJOR COMPONENTS OF THE 9600

TEMPERATURE SELECT SWITCH

The Temperature Select Switch and the POWER and READY Indicators are located on the front of the Main Unit. Whenever the unit is plugged into a standard wall outlet, the POWER indicator will illuminate. There is no power ON/OFF switch. The READY indicator will only illuminate when the temperature stabilizes at the temperature you have selected on the Temperature Select Switch.

NOTE: For specific operational details about the components of the 9600 Calibration Tester, see the Specifications Section at the end of this manual.

POWER INDICATOR

When unpacking the 9600 Calibration Tester, notice that the Power Module is permanently connected to the Main Unit. This is to assure a continuous power supply to the unit, since intermittent power would cause the unit to lose temperature control and would turn off the READY Indicator.

After the 9600 warms up, the unit will draw about 7 watts of power from a standard wall outlet; therefore, it may be left on continuously. However, if the unit will not be used for long periods of time, it may be unplugged.

READY INDICATOR

The 9600 Calibration Tester contains an independent temperature sensing circuit that senses temperature changes more precisely than the thermometers it tests.

Because the unit contains this independent circuitry, a failure in the temperature-control circuit will not alter its "READY-sensing" ability. It is virtually impossible for the READY indicator to illuminate if the temperature is incorrect.

NOTE: Do not use the unit if the READY indicator is not illuminated. If the 9600 does not show "Ready" within a few minutes of the time allowed in the Specifications Section of this manual, and the environment is within acceptable operating conditions, the unit is malfunctioning and should be returned to the factory for repair or replacement.

OVER-TEMPERATURE DETECTOR

In addition to the READY Indicator, the 9600 Calibration Tester contains an "Over-Temperature Detector." This is a fail-safe feature that protects the unit against over-temperature conditions, in the unlikely event that a failure should occur in the temperature-control circuitry. The over temperature control circuit overrides the normal control circuit, and holds the temperature slightly above the set point.

If a failure were to occur in the circuitry and it caused the unit to keep heating indefinitely, the Over-Temperature Detector would activate as soon as the temperature rose a few tenths of a degree above the set point. If this were to happen, the READY indicator would not illuminate, thereby alerting the user that the unit should not be used.

THERMOMETER HOLES

The internal "blackbody" of the 9600 Calibration Tester acts as a heat reservoir for the thermistor probe and as a heat radiator for the infrared-sensing aural thermometer.

The large hole under the flap in the top of the Main Unit is for Model 9000 infrared (IR) Aural thermometers and the small hole is for thermistor-based thermometers. For proper positioning of the thermometers in these holes, see the following section, "Using the 9600 System."

The surface texture inside the large hole must be flat (dull) and dry for proper IR readings. This hole should be black; you should only be able to see its surface under bright light. The small hole, which is not painted black, must be kept clean and dry.

The coating in this part of the unit is fragile, so please follow the cleaning instructions carefully. The surface of the unit should not be touched, nor should any foreign objects be inserted into the unit. It also is important to avoid spilling liquids onto the unit, even though it has a dust cover. If liquid or other contaminants are allowed to enter the unit, proper calibration cannot be assured.

USING THE 9600 SYSTEM

SETUP PROCEDURE

The 9600 Calibration Tester takes about 20 minutes to cool from its high setting to its low setting. When testing several thermometers at both temperatures, first test the units on the cool setting. Then switch settings, wait for the READY indicator to illuminate, and test the thermometers at the high setting.

To prepare the system for use, place the 9600 Calibration Tester on a level surface away from sunlight, drafts, and other heat and cold sources. Then take the following steps:

1. Set the Temperature Select Switch to the 96.4 °F position.
2. Plug the power adapter into a wall outlet.
3. Verify that the POWER indicator is on. If the POWER indicator is not on, check the connection to the power source, and verify that the outlet has power. Do not open the unit as there are no parts that can be serviced in the field. If the unit is opened, the warranty will become void.
4. Wait until the READY indicator lights continuously. The unit will take about 6 minutes to stabilize during which time the READY indicator might blink on and off briefly before staying on continuously.
5. After obtaining a temperature (as described in the following sections), switch the temperature setting to 106.0 °F, and wait for the READY Indicator to light continuously. This will take about 4 minutes.

LEVEL 1 CALIBRATION TEST

Level 1 Calibration Test is described on the instruction label on the top panel of the unit and in the following instructions. If a reading in the 9600 Tester is less than, or equal to, +/-0.3 °F from the temperature selected on the 9600, then the instrument is within specifications and no further testing is needed.

THE MODEL 9000 AND MODEL 9020 THERMOMETER

1. The Model 9000 (InstaTemp® and ThermoGuide™) Thermometer can be placed into a special Test Mode for checking the calibration using the 9600 System.

   The Test Mode is entered by simultaneously pressing the PULSE, TIMER, and MODE switches and is signified by a 'T' displayed on the thermometer LCD.

   The Test Mode will remain on as long as the "pulse timer" is active. Once in the Test Mode, the mode may be extended by repeatedly pressing the PULSE TIMER switch only. The Test Mode is exited automatically when the "pulse timer" times out. The thermometer mode will then change back to the thermometer mode prior to entering the Test Mode. The Test Mode may be exited before the "pulse timer" times out by pressing the MODE switch only. This will cause the thermometer mode to change to the ORAL mode.

NOTE: For thermometers having serial numbers less than 25000, the Test Mode is entered as an Operation Mode by repeatedly pushing the MODE switch, For these thermometers, the Test Mode will remain until the mode is manually changed - it will not automatically change back to the previous mode.

2. When the ready indicator is visible, push the slide forward to place a probe cover on the sensor.

3. Inspect the probe cover for integrity. If the probe cover is damaged, retract the slide fully to remove the damaged probe cover, When the ready indicator is visible, push the slide forward to replace the probe cover and then reinspect the integrity of the new cover.

4. Lift the flap and insert the tip of the Model 9000 Thermometer into the large opening on the 9600 Calibration Tester until it rests on top, perpendicular to the tester.

5. Immediately after inserting the thermometer, depress the scan button until you hear the temperature completed beep (about 3 seconds), then remove the thermometer from the 9600 Tester.

6. Verify that the reading on the Model 9000 Thermometer is within the following tolerances:

96.4°F Setting:	96.1°F to 96.7°F
106.0°F Setting:	105.7°F to 106.3°F

THERMISTOR THERMOMETERS

(Please note that the following procedure reflects the Model 600 series and later thermometers. When testing the Model 500, follow these instructions where possible.)

1. Set the thermometer to Monitor Mode and Fahrenheit (°F) following the instructions in the Users' Manual for the instrument to be tested.
2. Extract the probe from its holder, but do not load a probe cover.
3. Lift the flap and insert the probe fully into the small hole in the top of the 9600 Tester (the probe will go in approximately 1 3/4").
4. Wait 2 minutes for the temperature to fully stabilize.
5. Verify that the reading on the thermometer is within the following tolerances:

   96.4°F Setting: 96.1°F to 96.7°F
   106.0°F Setting: 105.7°F to 106.3°F

   See "Level 2 Calibration Test" to test units outside of these limits.

CELSIUS-ONLY THERMISTOR THERMOMETERS

1. Where possible, follow the instructions for the Model 600 series Thermometer.
2. The Fahrenheit Mode is the preferred mode for calibration testing of thermometers, because the temperature units (degrees) are smaller, and give a more accurate test. Therefore, whenever possible, use this mode.
3. For Celsius-Only Units, use the following conversion table for testing the calibration of the thermometer.

°Fahrenheit	°Celsius	°Fahrenheit	°Celsius
96.0	35.6	105.6	40.9
96.1	35.6	105.7	40.9
96.2	35.7	105.8	41.0
96.3	35.7	105.9	41.1
96.4	35.8	106.0	41.1
96.5	35.8	106.1	41.2
96.6	35.9	106.2	41.2
96.7	35.9	106.3	41.3
96.8	36.0	106.4	41.3

LEVEL 2 CALIBRATION TEST

Usually thermometer calibration will fall within the +/-0.3°F tolerance limit when tested in the 9600 Calibration Tester. This tolerance is the result of two elements: the thermometer system contributing +/-0.2°F, and the 9600 Tester contributing +/-0.1°F to the test reading.

If a Level 1 reading is greater than +/-0.3°F from the temperature selected, try the "Level 2 Calibration Test". If the Level 2 Test is not successful, then proceed to the TROUBLESHOOTING Section.

There are several variables that must be checked before concluding that a thermometer is out of calibration. They are described on the following pages.

LEVEL 2 CALIBRATION TEST

If the Level 1 Calibration Test is not successful - that is, if the reading is greater than +/-0.3°F from the temperature selected - conduct the Level 2 Calibration Test.

1. Check to see that the 9600 READY indicator is on continuously. It should not go out unless the temperature selection is changed. If the READY indicator goes out occasionally, be sure the unit is away from drafts, direct sunlight, and other heat and cold sources, and that there is continuous power to the unit.

   If the READY indicator does not come on, but the unit reads close to the temperature selected then there is an internal malfunction and the temperature is being controlled by the Over-Temperature Protection Circuitry. This temperature is not a calibrated temperature and cannot be used to test thermometers. If this should happen, the 9600 Unit should be returned to the factory for repair.

2. Check the temperature of the room. It must be within 65°F and 80°F (18.3°C and 26.7°C).

3. **For Model 9000 and Model 9020 Thermometers**, use the following procedure.

   - Ensure that the sensor is free from debris. To do this, first load a probe cover, then peel the probe cover off the tip. If the tip appears clean, retract the probe. If you see dust or other debris on the tip, clean the surface following the first 2 steps of the procedure in the Model 9000 CALIBRATION ADJUSTMENT Section of this manual.

- With a clean tip, load a new probe cover and take three readings in the 9600 Tester at each temperature. Inspect the probe cover for integrity and proper loading before each reading. If any tears in the tip of the probe cover are found, discard the probe cover and load another one. If all six readings are +/-0.3°F or less from the temperatures selected, the thermometer is within tolerance. If any reading is +/-0.4°F or greater, proceed to the TROUBLESHOOTING section.

4. **For Thermistor Thermometers**, use the following procedure.

   Check the connections between the probe and the thermometer. If the probe cable is cracked or frayed, replace the probe. If the probe shaft is bent or loose in the handle, or otherwise damaged, replace the probe. If there are no problems with the probe, disconnect and reinsert it into the thermometer, and take another reading. If the reading is no more than +/-0.3°F from the temperature selected, then the unit is within tolerance. If the reading is +/-0.4°F or greater, proceed to the TROUBLESHOOTING section.

TROUBLESHOOTING

Follow the troubleshooting procedure if a reading from the previous testing levels is more than +/-0.3°F from the temperature selected on the 9600 Tester.

If the procedures for the Level 1 and Level 2 Calibration Tests have been followed and the tests were unsuccessful, chances are that the unit is out of calibration. However, before replacing the unit, complete the following steps.

MODEL 9600 CALIBRATION CHECKS

If several thermometers do not pass the Level 1 or Level 2 Calibration Tests, there is a chance that the 9600 Tester is out of calibration. There are several variables that can be checked to verify if the unit is out of calibration.

1. Check the calibration date on the front of the 9600 Tester. The unit must have calibration validated annually.

2. Make sure that the 9600 Tester has not been opened. If the calibration label has been tampered with, the calibration and the warranty will be void.

3. Ensure that the unit has not been exposed to extreme temperatures that can damage the precision thermistors in the 9600 Tester. Exposure to high heats can cause the resistance vs. temperature characteristic of the unit to shift, causing the 9600 Tester to lose calibration. ***Never autoclave the 9600 Tester.***

ENVIRONMENTAL CHECKS

1. Make sure there is no excessive moisture or steam in the air. High humidity (above 96%) can cause electrical leakages that can temporarily shift the temperature out of calibration. If the thermometers and/or the 9600 Tester have been exposed to such conditions, they should be allowed to sit at normal room temperature for at least 30 minutes before a calibration test is conducted.

2. Thermal gradients in the thermometer or the 9600 Tester can cause unpredictable effects.

   Two examples of exposure to extreme temperatures are:

   - Carrying the thermometer between buildings on a cold winter day,
   - Exposing the thermometer to the sun on a window sill.

3. Test the calibration at or near the normal room temperature for use of the thermometer. If the room temperature is at the extreme ends of the specified temperature range, a unit that is within specification under normal usage temperatures could be out of calibration.

MODEL 9000 CALIBRATION ADJUSTMENT

This procedure allows for manual calibration adjustments of a Welch Allyn Model 9000 Thermometer which has failed the Troubleshooting Test described in this manual.

The Model 9000 (InstaTemp® and ThermoGuide™) Thermometer can be placed into a special Test Mode for checking the calibration using the 9600 System.

The Test Mode is entered by simultaneously pressing the PULSE, TIMER, and MODE switches and is signified by a "T" displayed on the thermometer LCD.

The Test Mode will remain on as long as the "pulse timer" is active. Once in the Test Mode, the mode may be extended by repeatedly pressing the PULSE TIMER switch only. The Test Mode is exited automatically when the "pulse timer" times out. The thermometer mode will then change back to the thermometer mode prior to entering the Test Mode. The Test Mode may be exited before the "pulse timer" times out by pressing the MODE switch only. This will cause the thermometer mode to change to the ORAL mode.

NOTE: For thermometers having serial numbers less than 25000, the Test Mode is entered as an Operation Mode by repeatedly pushing the MODE switch. For these thermometers, the Test Mode will remain until the mode is manually changed - it will not automatically change back to the previous mode.

PRIOR TO CALIBRATION ADJUSTMENT

The sensor lens must be absolutely clean. If the lens is not clean, perform the following cleaning procedure twice prior to calibration:

- Using a cleaning swab slightly moistened with isopropyl alcohol, clean the surface with a gentle circular motion. Immediately wipe the lens with a clean, dry swab using the same circular motion.
- After cleaning the lens, allow at least 60 minutes for the sensor to stabilize before taking temperatures with the thermometer.
- Set the Model 9600 Calibration Tester to the 106°F position.
- Set the thermometer to be adjusted to the Test Mode (T) and Fahrenheit (F) display.

ESTABLISHING A BASELINE PRIOR TO MAKING CALIBRATION ADJUSTMENTS

Take 2 temperatures into the 106°F opening of the 9600 from each of 5 different probe cover dispensers and record the readings. The 10 readings are then averaged to compute the present thermometer calibration.

SETTING THE THERMOMETER TO THE CALIBRATION ADJUSTMENT MODE

1. Insert the thermometer into a wall mount.
2. Move the slide forward and then press the scan switch and activate the mode switch simultaneously.
3. Remove the thermometer from the wall mount and retract the slide. Move the slide forward and activate the mode switch. The mode display should indicate "O" with "OO" on the main display if no prior adjustment has been made.
4. Use the F/C switch to increase the number and the Pulse switch to decrease the number according to the following table:

10 Temperature Average Reading with Probe Cover	New Calibration Number
105.6	Old number + l0
105.7	Old number + 8
105.8	Old number + 5
105.9	Old number + 3
106.0	Old number + 00
106.1	Old number - 03
106.3	Old number - 09
106.4	Old number - 10

5. Retract the slide and retest the thermometer in a black body with probe covers using the 2 covers from 5 dispensers as above.

SPECIFICATIONS

Power Requirements

Voltage	II5 VAC +/-10%, 60 Hz (220VAC +/-10%, 50 Hz for European)
Current	
Heating	130 mA
After Warm-Up	60 mA
Internal Fuse Rating	1.6A
Power Consumption	
Heating	15.6W
After Warm-Up	7.2W

Mechanical

Main Unit	
Length	150 mm (5.9")
Width	80 mm (3.15")
Height	80 mm (3.15")
Power Pack (approximate dimensions)	
Length	83 mm (3.25")
Width	61 mm (2.4")
Height	76 mm (3.0")
Weight	20 lbs

Environment

Storage Temperature	32°F - 122°F (0°C - 50°C)
Operating Temperature Range	65°F - 80°F (183°C - 26.7°C)
Operating Humidity	20% to 90% RH. Non-Condensing

Operating Specifications

Controlled Temperature of 9600	
Low Setting	96.4°F
High Setting	106.0°F
Temperature Tolerance	+/-0.1°F
READY Indicator Temperature Tolerance	+/-0.1°F

Heating and Cooling Times

Time to Heat to Low Setting from Room Temperature	6 min.
Time to Heat to High Setting from Low Setting	4 min.
Time to Cool from High Setting to Low Setting	20 min.

LIMITED WARRANTY

Instrumentation purchased new from Welch Allyn is warranted to be free from defects in material and workmanship under normal use and service for a period of one year from the date of first shipment from Welch Allyn. This warranty shall be fulfilled by Welch Allyn or its authorized representative repairing or replacing, at Welch Allyn's discretion, any such defect free of charge for parts and labor.

Welch Allyn should be notified via telephone of any defective product and the item should be immediately returned, securely packaged and postage prepaid
to Welch Allyn . Loss or damage in shipment shall be at purchasers' risk.

Welch Allyn will not be responsible for loss associated with the use of any Welch Allyn Product that (1) has had the serial number defaced, (2) has been repaired by anyone other than an authorized Welch Allyn Service Representative, (3) has been altered, or (4) has been used in any manner other than in accordance with instructions.

THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR PARTICULAR PURPOSE, OR OTHER WARRANTY OF QUALITY, WHETHER EXPRESS OR IMPLIED, Welch Allyn WILL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES.

Welch Allyn®

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